

To BEB file
10/2/91

MRID No. 416634-01

care

DATA EVALUATION RECORD

1. **CHEMICAL:** PCNB.
Shaughnessey number: 056502.
2. **TEST MATERIAL:** PCNB Technical, Lot #GAB39011, CAS #82-68-8, 99% purity, pale yellow fine crystal solid.
3. **STUDY TYPE:** Early Life Stage Test for Freshwater Fish.
Species tested: Rainbow Trout (Oncorhynchus mykiss).
4. **CITATION:** Cohle, P. and R. Herzig. 1990. Early Life Stage Toxicity of PCNB to Rainbow Trout (Oncorhynchus mykiss) in a Flow-Through System. ABC Laboratory Project Number 36871. Prepared by Analytical Bio-Chemistry Laboratories, Inc., Columbia, Missouri. EPA MRID No. 416634-01.
5. **REVIEWED BY:**

Kelly A. Carr
Aquatic Toxicologist
Toxikon Environmental Sciences

Signature: Kelly A. Carr
Date: 5/21/91
6. **APPROVED BY:**

Pim Kosalwat, Ph.D.
Senior Toxicologist
KBN Engineering and
Applied Sciences, Inc.

Signature: P. Kosalwat
Date: 5/24/91

Henry T. Craven, M.S.
Supervisor, EEB/HED
USEPA

Signature: Charles J. Craven
Henry T. Craven
Date: 8/28/91
9/23/91
7. **CONCLUSIONS:** This study appears scientifically sound and fulfills the guideline requirements for a freshwater fish early life stage toxicity test. The maximum acceptable toxicant concentration (MATC) for PCNB was determined to be > 13 and < 32 $\mu\text{g/L}$ mean measured concentrations (geometric mean MATC = 20 $\mu\text{g/L}$) based upon the most sensitive parameters (length and weight).
8. **RECOMMENDATIONS:** N/A.

30 hrs



9. **BACKGROUND:**

10. **DISCUSSION OF INDIVIDUAL TESTS:** N/A.

11. **MATERIALS AND METHODS:**

A. Test Animals: Rainbow trout (*Oncorhynchus mykiss*) eggs and milt used in this test were obtained from Mt. Lassen Trout Farm, Red Bluff, California. Eggs from four females were fertilized with milt from six males at ABC Labs in soft water at 8°C. The eggs were allowed to water harden for approximately two hours before being added to the test system.

B. Test System: The test was conducted in a continuous flow, proportional diluter which provided, for the first 75 days of the 95-day study, approximately 6.6 volume additions of test solution/dilution water every 24 hours. The last 20 days of the study, volume additions were increased to approximately 11.9 per 24 hours as a precaution against DO deprivation.

The diluter was equipped with a Hamilton[®] Model 420 syringe dispenser for introduction of PCNB to the four replicate test chambers per concentration, adding a total volume of test solution/dilution water of about 500 mL per cycle. Test chambers were duplicate glass aquaria measuring 15.6 x 30.7 cm with a water depth of approximately 25 cm yielding an approximate continuous volume of 12 liters. The eggs were held in incubation cups made from glass tubing (9.0 cm in diameter by 14 cm high) with 16 mesh Nytex[®] screening glued to the bottom with silicone. When the eggs reached the eyed stage, the incubation cups were vertically oscillated (3 to 6 cm) by means of a rocker arm driven by a low rpm electric motor. Test temperature was regulated by immersing the test aquaria in a water bath held at ~10°C.

During the first week of the study, the test system was shielded from excess light. On Day 8 post-hatch, incandescent lights were begun to simulate a 16-hour light/8-hour dark photoperiod. On Day 9, fluorescent lights were added to the system and a 30 minute dawn/dusk transition period was included. The mean light intensity (measured with a Licor, Inc. Quantum/Radiometer/Photometer Model LI-185B using an LI-210 SB Photometric sensor) was 111 ± 17.1 footcandles at the water surface.

Dilution water for the test was obtained from a deep, uncontaminated well. Part of the well water was passed through a reverse osmosis system and then blended back with

untreated water for a total hardness of 40-50 mg/L (as CaCO_3), alkalinity of 40-60 mg/L (as CaCO_3), conductivity of 90-150 μS , and a pH of about 7.8.

C. Dosage: Ninety-five-day life-cycle test. Five nominal test concentrations of 3.8, 7.5, 15, 30, and 60 $\mu\text{g/L}$ were tested.

D. Design: Five concentrations, a control, and a solvent control were used in this study. The solvent was dimethylformamide (DMF) and was maintained at 6.9 $\mu\text{L/L}$ in the solvent control and 6.4 $\mu\text{L/L}$ in all test solutions. There were four replicate exposure chambers (two in each duplicate tank) for each concentration and the controls. Newly fertilized rainbow trout eggs were impartially distributed, by fives, to replicate chambers until each one contained 40 eggs, giving a total of 160 eggs per concentration. An additional 50 eggs were placed in separate incubation cups in the four replicate dilution water controls for determining viability. These eggs were removed on Day 11 and the embryo cleared with 10% glacial acetic acid solution to determine viability by the presence of a neural keel. The mean percent viability of the replicates was determined to be 99%.

Egg mortality was recorded daily and dead embryos were removed at that time. The eggs were shielded from excess light during incubation and after hatch, until Day 8 post-hatch, when lighting regimes were begun that continued for the remainder of the test. When hatching began (day 31), number of embryos hatched was recorded daily. Three days after hatching was completed (on day 36), the number of larval fry was reduced to 15 per replicate. Time to swim-up was recorded for each concentration. Abnormal behavior, physical changes, and mortalities were noted and recorded daily.

Feeding was begun 16 days post-hatch and consisted of live brine shrimp nauplii (Ocean Star International, Inc., Snowville, Utah); and Salmon starter (Zeigler Bros., Inc., Gardners, Pennsylvania), first ground into a mash, then fed in small pellet form as the fish increased in size. The fish were fed three times a day. Loading biomass at test termination was calculated as 0.140 g/L.

Growth measurements (determined as standard length of the fry) were taken on test day 68 (35 days post-hatch) using the photographic method of McKim and Benoit. Length measurements were taken again at the end of the study (test day 95, day 62 post-hatch) after the fish were sacrificed

with tricane methanesulfonate (MS-222). Wet weights were also taken at test termination, after the fish were blotted dry to remove excess moisture.

Sample days for water quality readings and chemical analysis were on days 0, 1, 7, and every 7 ± 2 days throughout the test including the final day of the study. On each sample day, temperature, and DO were measured in the A replicate of each concentration and the controls. Conductivity, pH, hardness, and alkalinity were measured in the A replicate of the dilution water control, the low and the high test concentrations. In addition, temperature was measured twice daily from a single test chamber and continuously by a data logger. No mention was made as to which test chamber measurements were taken from for the twice daily readings or where the probe for the continuous temperature readings was located.

Samples for chemical analysis were collected on sample days from all test concentrations, the dilution water control, the solvent control, and the diluter stock solution. The 25-mL stock at the diluter was kept in an amber bottle and connected to the dispensing syringe with Teflon tubing. This stock was replenished when necessary from a larger stock volume stored under refrigeration.

E. Statistics: The statistical analysis for this test was performed using SystatTM (Version 3.0) software package and analyzed as appropriate for a nested experimental design. Statistical significance was at the 0.05 level. There was no statistically significant differences found between the dilution water control and the solvent control data in either the 2 x 2 contingency table (frequency) analysis used for hatch and fry survival or in the t-tests used for length and weight data. Since percent hatch, length and weight were slightly greater in the solvent control, it was used for analysis with the test concentrations as the most rigorous comparison. The 2 x 2 contingency table analysis was used for hatch and survival comparison to all concentrations. Effect on hatchability and fry survival was demonstrated in the 52- $\mu\text{g/L}$ concentration, therefore the growth data for that concentration were not included in the length and weight analysis. An ANOVA was performed on the length and weight data followed by Tukey's HSD means comparison test. Only fish exposed to 32 $\mu\text{g/L}$ showed a statistically significant reduction in length and weight. Although not included in the analysis, fish exposed to 52 $\mu\text{g/L}$ showed considerably decreased lengths and weights as compared to the rest of the test levels (Table 10, attached).

12. **REPORTED RESULTS:** The mean measured PCNB test concentrations ranged from 79 to 107% of nominal. Five mean measured concentrations of the test substance were tested: 3.0, 6.5, 13, 32, and 52 $\mu\text{g/L}$ (Table 4, attached). The effect of PCNB on rainbow trout (*Oncorhynchus mykiss*) hatchability, survival, and growth is presented in Table 10. Statistically significant effects on hatchability and fry survival were seen only at 52 $\mu\text{g/L}$. Significant growth effects were seen down to 32 $\mu\text{g/L}$. Swim up data were not statistically analyzed, but it was stated that a very noticeable delay in swim-up was seen at 52 $\mu\text{g/L}$ and that a somewhat delayed swim-up appeared to occur at 32 $\mu\text{g/L}$. Sublethal effects, both physical and behavioral, were noted and appeared with the greatest variety and frequency at 52 $\mu\text{g/L}$, the only concentration at which the effects were considered biologically significant.

Control water parameters for the duration of the test ranged: for DO, 9.3-10.4 mg/L; temperature, 9.2-11.1°C; pH, 7.6-8.2; conductivity, 90-390 $\mu\text{S/cm}$; alkalinity, 46-268 mg/L; and hardness, 38-230 mg/L. These parameters were measured every seven days during the test in the dilution water control, the low concentration, and the high concentration, as recorded in Table 7 (attached).

Temperature throughout the test ranged from 9.0 to 11.4°C. DO concentrations were from 9.0 to 10.9 mg/L (83 to 101% of saturation). The pH ranged from 7.6 to 8.2 in the control, low, and high concentrations. Conductivity ranged from 80 to 130 μS (except days 56 and 57 when it ranged from 130 to 390 μS). Hardness (as CaCO_3) was from 38-48 mg/L and alkalinity (as CaCO_3) was from 46-60 mg/L (except days 56 and 57 when they were 70 to 230 mg/L and 80 to 268 mg/L, respectively). The reason for the deviations on days 56 and 57 was a malfunction in the dilution water system that allowed non-blended well water to enter the test system. No deleterious effects were noticed by the researchers.

13. **STUDY AUTHOR'S CONCLUSIONS/QUALITY ASSURANCE MEASURES:** The only test concentration that had a statistically significant reduction in hatchability or fry survival was 52 $\mu\text{g/L}$. Sublethal effects were also most notable at this concentration. Growth was significantly affected at 32 $\mu\text{g/L}$. The maximum acceptable toxicant concentration (MATC) was determined by taking the geometric mean of the NOEC (the no-observed-effect concentration) at 13 $\mu\text{g/L}$ and the LOEC (the lowest-observed-effect-concentration) at 32 $\mu\text{g/L}$ for an MATC of 20 $\mu\text{g/L}$.

A GLP compliance statement was included in the report. The study was audited and the final report reviewed by ABC Laboratories' Quality Assurance Unit. A statement of quality assurance was included in the report, indicating that the study was conducted in accordance with Good Laboratory Practice Standards as set forth in Title 40 of the Code of Federal Regulations, Part 160.

14. REVIEWER'S DISCUSSION AND INTERPRETATION OF STUDY RESULTS:

- A. Test Procedure:** Test procedures were in accordance with protocols recommended by the Guidelines, but deviated from the SEP as follows:
 - o The SEP recommends a dilution water hardness of 40 to 48 mg/l as CaCO_3 . During most of the study ABC was within the guidelines, but on days 56 and 57 of the study hardness reached a high of 230 mg/L.
 - o The SEP recommends a dilution water pH of 7.2 to 7.6. In this study the pH was from 7.6 to 8.2
- B. Statistical Analysis:** The reviewer used the EPA Dunnett's statistical computer program to determine significance in percent hatch and percent survival following arcsine percentage transformation of percentages. The treatment means were compared to the solvent control means to establish statistical significance. Statistical analysis of length and weight data taken on days 68 and 95 of the test were determined as follows: first a two-tailed test was run to determine statistical significance between the control and solvent control, and then an ANOVA for unequal sample sizes was performed using the solvent control against the test concentrations (and excluding the 52 $\mu\text{g/L}$ concentration). All statistical analysis was performed at the 0.05 level of significance. Finally the maximum acceptable toxicant concentration (MATC) of PCNB was determined.
- C. Discussion/Results:** Dunnett's analysis of the percent hatchability and percent survival showed significance only at the 52 $\mu\text{g/L}$ concentration. Using the two-tailed t-test, no significant difference was found between the control and solvent control results for growth. Analysis of length and weight data showed significance at the 32 $\mu\text{g/L}$ concentration. The MATC was determined to be > 13 and $< 32 \mu\text{g/L}$ mean measured

concentration (geometric mean MATC = 20 $\mu\text{g/L}$). All analysis by the reviewer corroborated the results given by ABC Laboratories.

D. Adequacy of the Study:

- (1) Classification: Core.
- (2) Rationale: N/A.
- (3) Repairability: N/A.

15. COMPLETION OF ONE-LINER: Yes, 5-21-91.

TABLE 6
Dissolved Oxygen and Temperature Measurements for the PCNB Early Life
Stage Toxicity Study with Rainbow Trout (*Oncorhynchus mykiss*)

Study Day	Dilution Water		Solvent Control		Level-1 a (3.8 µg/L)		Level-2 a (7.5 µg/L)		Level-3 a (15 µg/L)		Level-4 a (30 µg/L)		Level-5 a (60 µg/L)	
	D.O. ^b mg/L	Temp. ^c °C	D.O. mg/L	Temp. °C	D.O. mg/L	Temp. °C	D.O. mg/L	Temp. °C	D.O. mg/L	Temp. °C	D.O. mg/L	Temp. °C	D.O. mg/L	Temp. °C
0	9.5	10.6	9.6	11.0	9.7	11.0	9.6	10.7	9.7	11.2	9.7	11.3	9.9	11.1
1	9.4	9.4	9.5	9.6	9.5	9.6	9.7	9.5	9.7	9.7	9.7	9.8	9.8	9.7
7	9.5	10.4	9.8	10.4	9.7	10.3	9.7	10.5	9.7	10.5	9.7	10.5	9.9	10.5
14	9.7	10.7	9.9	10.7	9.9	10.5	10.1	10.8	9.9	10.9	9.9	10.9	10.1	10.8
21	9.5	10.7	9.8	10.9	9.7	10.8	9.8	10.9	9.7	11.1	9.7	11.0	10.0	11.0
28	9.7	10.3	9.9	10.4	10.0	10.4	10.3	10.4	9.8	10.5	9.7	10.6	9.8	10.5
35	10.4	10.7	10.4	10.7	10.4	10.8	10.4	10.7	10.3	11.0	10.4	11.1	10.5	11.0
42	10.0	11.1	9.9	11.0	10.0	11.2	10.0	11.2	10.0	11.3	10.0	11.3	10.3	11.3
49	10.2	10.0	10.6	10.2	10.5	10.1	10.9	10.0	10.9	10.3	10.8	10.3	10.9	10.2
56	9.8	10.8	9.8	10.8	9.9	10.8	10.0	10.8	9.9	11.0	9.9	11.1	10.1	10.9
63	10.1	10.7	10.1	10.7	10.3	10.7	10.3	10.7	10.2	10.8	10.2	10.8	10.4	10.8
70	9.3	10.4	9.2	10.5	9.4	10.4	9.5	10.4	9.1	10.4	9.3	10.6	9.6	10.5
77	9.3	10.8	9.1	10.7	9.2	10.7	9.2	10.9	9.1	10.8	9.2	11.0	9.7	10.7
83	9.4	10.0	9.3	10.1	9.4	10.1	9.5	10.1	9.5	10.1	9.5	10.3	10.0	10.2
91	9.3	10.1	9.1	10.1	9.0	10.2	9.2	10.2	9.0	10.3	9.1	10.4	9.7	10.4
95	9.8	9.2	9.4	9.4	9.7	9.1	9.5	9.2	9.6	9.2	9.6	9.3	10.0	9.3

Note: Minimum and maximum temperatures as recorded during twice daily temperature measurements were 9.0 and 11.4°C, respectively.

Dissolved oxygen saturation (corrected for altitude of Columbia, MO) at temperatures of 9, 10, and 11°C is 11.0, 10.8 and 10.6 mg/L, respectively. Dissolved oxygen and temperature measurements in this table are from the A replicate chambers.

a Nominal test concentrations.

b D.O. = dissolved oxygen. Measured with a Nester Instruments Dissolved Oxygen/BOD Meter, Model No. 8500 or a YSI Model 54A Oxygen Meter.

c Temp. = temperature. Measured with a Mercury Thermometer and a VWR Scientific, Inc. Digital Thermometer.

TABLE 7

**Water Quality Measurements From the PCNB Early Life Stage Toxicity
Study With Rainbow Trout (*Oncorhynchus mykiss*)**

Study Day	Dilution Water Control				Low Concentration				High Concentration			
	pH ^a	Cond. ^b (μ S/cm)	Alk. ^c (mg/L)	Hard. ^d (mg/L)	pH	Cond. (μ S/cm)	Alk. (mg/L)	Hard. (mg/L)	pH	Cond. (μ S/cm)	Alk. (mg/L)	Hard. (mg/L)
0	7.7	100	54	48	7.8	100	54	48	7.8	100	54	48
1	7.8	100	---	---	7.9	100	---	---	8.0	100	---	---
7	7.9	90	56	48	8.0	80	54	48	8.0	80	56	48
14	7.9	90	56	46	7.9	90	56	46	7.9	90	56	46
21	8.0	110	56	48	8.1	100	56	48	8.1	100	56	48
28	8.0	90	50	40	8.0	80	50	40	8.0	80	50	40
35	8.0	100	54	46	8.0	90	54	46	8.0	90	54	46
42	8.0	110	54	48	8.0	100	54	48	8.0	100	54	48
49	8.0	100	52	44	8.0	90	52	44	8.0	90	52	44
56	8.2	390	268	230	8.2	380	268	230	8.2	380	268	230
57	8.0	130	80	70	8.0	140	80	74	8.0	140	80	72
58	7.8	100	54	48	7.8	90	56	48	7.8	90	54	46
63	7.8	90	48	42	7.8	90	48	42	7.9	90	48	42
70	8.1	90	54	44	8.1	90	54	44	8.1	90	52	48
77	8.1	90	60	46	8.1	90	56	44	8.1	90	58	44
83	8.0	130	48	38	8.0	130	46	42	8.0	125	48	40
91	7.9	111	48	42	7.8	125	48	42	7.8	122	48	42
95	7.6	108	46	40	7.6	108	48	40	7.7	107	46	40

^a pH measured with a Beckman ϕ 12 pH/ISE Meter.

^b Cond. = conductivity. Measured with a YSI Model 33 S-C-T Meter or a Corning Check Mate 90 Conductivity/TDS System. The measurement unit μ S/cm is equivalent to umhos/cm.

^c Alk. = alkalinity. Total (as CaCO_3) using a colorimetric titration.

^d Hard. = hardness. Total (as CaCO_3) using a colorimetric titration.

Note: Measurements of water quality parameters were from the A replicate chambers of the control, low and high test concentrations.

TABLE 10

Egg Hatchability, Fry Survival, Standard Length and Wet Weight of
Rainbow Trout (*Oncorhynchus mykiss*) Exposed to PCNB

Mean Measured PCNB Concentrations ($\mu\text{g/L}$)	35 Days Post-Hatch			62 Days Post-Hatch		
	Hatchability ^a (% Hatch)	Fry Survival (%)	Mean Stan. Length & Stan. Deviation (mm)	Fry Survival (%)	Mean Stan. Length & Stan. Deviation (mm)	Mean Wet Weight & Stan. Deviation (g)
Dilution Water Control	88	100	28.8 \pm 1.94	100	42.5 \pm 4.47	1.183 \pm 0.383
Solvent Control	89	100	29.3 \pm 1.93	100	43.7 \pm 4.00	1.301 \pm 0.375
3.0	96	100	29.1 \pm 1.53	100	43.1 \pm 3.23	1.238 \pm 0.293
6.5	92	100	29.4 \pm 2.09	98	43.9 \pm 4.07	1.337 \pm 0.347
13	96	100	29.1 \pm 1.88	100	43.8 \pm 3.11	1.297 \pm 0.323
32	93	100	28.2 \pm 1.76*	100	41.7 \pm 3.64*	1.074 \pm 0.304*
52	73*	75*	23.3 \pm 2.87 ^b	73*	32.4 \pm 5.67 ^b	0.475 \pm 0.215 ^b

*Indicates statistically significant ($P < 0.05$) reduction when compared to solvent control.

^a Percent hatch calculated from day 39 biological observations data.

^b Since a hatchability and survival effect had been demonstrated at the 52 $\mu\text{g/L}$ test level, the growth data for this level was not included in length and weight analysis.

Shaughnessey # 056502 Chemical Name PCNB Chemical Class _____ Page _____ of _____

Study/Species/Lab/ MRID #	Chemical % a.i.	Results	Reviewer/ Date	Validation Status
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Chronic Fish		Concentrations Tested (pp b) = <u>3.0, 6.5, 13, 32, & 52</u>		
	<u>99</u>			

Species: <u>Oncorhynchus</u> <u>mykiss</u>	MATC = > <u>13</u> < <u>32</u> PP b .		<u>KAC</u>	<u>CORE</u>
Lab: <u>ABC Laboratories</u>	Effectuated Parameters = <u>Length and Weight at 32 and 52 ppb</u>		<u>5-21-91</u>	

MRID # 416634-01

Control Mortality (%) = 100 Solvent Control Mortality (%) = 100

Comments: Concentrations reported as mean measured concentrations of PCNB.

Chronic Invertebrate	Concentrations Tested (pp____) = _____			
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Species:	MATC = > _____ < _____ PP_____.			
Lab:	Effectuated Parameters = _____			

MRID # _____

Control Mortality (%) = _____ Solvent Control Mortality (%) = _____

Comments: _____

Summary Statistics and ANOVA

Transformation = None

Group	n	Mean	s.d.	cv%
1 = control	2	70.3400	1.7253	2.5
2	2	80.3950	4.6881	5.8
3	2	73.4250	.9687	1.3
4	2	78.2400	3.7618	4.8
5	2	74.8600	3.1396	4.2
6*	2	58.5150	3.2315	5.5

*) the mean for this group is significantly less than
the control mean at alpha = 0.05 (1-sided) by Dunnett's test

Minimum detectable difference for Dunnett's test = -8.974875
This difference corresponds to -12.76 percent of control

Between groups sum of squares = 603.699142 with 5 degrees of freedom.

Error mean square = 10.057358 with 6 degrees of freedom.

Bartlett's test p-value for equality of variances = .869

EPA Dunnett's computer program analysis of hatchability.
KAC 4/23/91

pcnday68 *Survival*

Summary Statistics and ANOVA

Transformation = None

Group	n	Mean	s.d.	cv%
1 = control	2	90.0000	.0000	.0
2	2	90.0000	.0000	.0
3	2	90.0000	.0000	.0
4	2	90.0000	.0000	.0
5	2	90.0000	.0000	.0
6*	2	61.9250	18.4908	29.9

*) the mean for this group is significantly less than
the control mean at alpha = 0.05 (1-sided) by Dunnett's test

Minumum detectable difference for Dunnett's test = -21.363259
This difference corresponds to -23.74 percent of control

Between groups sum of squares = 1313.676042 with 5 degrees of freedom.

Error mean square = 56.985208 with 6 degrees of freedom.

*
* Warning - the test for equality of variances *
* could not be computed as 1 or more of the *
* variances is zero. *
*

*EPA Dunnett's computer program analysis of percent survival
to Day 68. KAC 4/23/91*

Summary Statistics and ANOVA

Transformation = None

Group	n	Mean	s.d.	cv%
1 = control	2	90.0000	.0000	.0
2	2	90.0000	.0000	.0
3	2	84.7650	7.4034	8.7
4	2	90.0000	.0000	.0
5	2	90.0000	.0000	.0
6*	2	60.9450	19.8768	32.6

*) the mean for this group is significantly less than
the control mean at alpha = 0.05 (1-sided) by Dunnett's test

Minumum detectable difference for Dunnett's test = -24.505700
This difference corresponds to -27.23 percent of control

Between groups sum of squares = 1351.261800 with 5 degrees of freedom.

Error mean square = 74.982750 with 6 degrees of freedom.

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*****
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* Warning - the test for equality of variances *
* could not be computed as 1 or more of the *
* variances is zero. *
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*****
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*EPA Dunnett's computer program analysis of percent survival
to Day 95. JAC 4/23/91*

J-test : for length 35-Day Post Hatch
Control vs. Solvent Control

$$T = 1.655154$$

for length 62-Day Post Hatch
Control vs. Solvent Control

$$T = 1.7289$$

for weight 62-Day Post Hatch
Control vs. Solvent Control

$$T = 1.70511$$

T-value for 2-sided T-test from tables
= 2.000

Therefore none of these tests show significant difference between the Control and Solvent Control.

The calculated maximum allowable toxicant concentration

$$\begin{aligned} \text{MATE} &= \left(\log_{10}^{\text{32 } \mu\text{g/L}} \text{LOEC} + \log_{10}^{\text{13 } \mu\text{g/L}} \text{NOEC} \right)_{\text{mean}} \\ &= (1.114 + 1.505) \div 2 \\ &= 20.4 \mu\text{g/L} \end{aligned}$$

Dunnnett's analysis performed on length and weight data using numbers from ANOVA analysis.

KAC 4/23/91

PCNB

① 35-Day Post-Hatch Length:

$$d' = t \sqrt{s^2 \left(\frac{1}{r_i} + \frac{1}{r_j} \right)}$$

$$= 2.16 \sqrt{3.344121 \left(\frac{1}{60} + \frac{1}{60} \right)}$$

$$= 0.7211641$$

error df = 295

p = 4

t = 2.16

60 observations for all treatments

mean Ctl Length - mean 1st. Length (mm)

$$29.3 - 29.1 = 0.2 \quad \text{1st 1}$$

$$29.3 - 29.4 = -0.1 \quad \text{1st 2}$$

$$29.3 - 29.1 = 0.2 \quad \text{1st 3}$$

$$29.3 - 28.2 = 1.1 * \quad \text{1st 4}$$

② 62-Day Post-Hatch Length

error df = 290

p = 4

t = 2.16

$$d' = t \sqrt{s^2 \left(\frac{1}{r_i} + \frac{1}{r_j} \right)}$$

$$= 2.16 \sqrt{13.1903 \left(\frac{1}{59} + \frac{1}{59} \right)}$$

$$= 1.4443421$$

59 obs. for 1st 1 + 2

58 obs. for 1st 3

60 obs. for 1st 4

mean Ctl Length - mean 1st. Length (mm)

$$43.7 - 43.1 = 0.6 \quad \text{1st 1}$$

$$43.7 - 43.9 = -0.2 \quad \text{1st 2}$$

$$d' = 2.16 \sqrt{13.1903 \left(\frac{1}{59} + \frac{1}{58} \right)}$$

$$= 1.450554$$

$$d' = 2.16 \sqrt{13.1903 \left(\frac{1}{59} + \frac{1}{60} \right)}$$

$$= 1.4383115$$

$$43.7 - 41.7 = 2.0 * \quad \text{1st 4}$$

$$43.7 - 43.8 = -0.1 \quad \text{1st 3}$$

62-Day Post-Hatch Weights:

$$d' = t \sqrt{s^2 \left(\frac{1}{r_L} + \frac{1}{r_j} \right)}$$

$$= 2.16 \sqrt{0.1086535 \left(\frac{1}{59} + \frac{1}{59} \right)}$$

$$= 0.1310885$$

$$\text{error df} = 290$$

$$p = 4$$

$$t = 2.16$$

mean Ctl wt. - mean 1st. wt. (g)

$$1.301 - 1.238 = 0.063 \quad \text{1st. 1}$$

$$1.301 - 1.337 = -0.036 \quad \text{1st. 2}$$

$$d' = 2.16 \sqrt{0.1086535 \left(\frac{1}{59} + \frac{1}{58} \right)}$$

$$= 0.1316524$$

$$1.301 - 1.297 = 0.004 \quad \text{1st. 3}$$

$$d' = 2.16 \sqrt{0.1086535 \left(\frac{1}{59} + \frac{1}{60} \right)}$$

$$= 0.1305412$$

$$1.301 - 1.074 = 0.227 * \quad \text{1st. 4}$$

File name = lgth62d.RPT
Date of report : 04-09-1991

ANOVA FOR UNEQUAL REPLICATES

TREATMENT# 1

OBSERVATION#	1	=	43.15
OBSERVATION#	2	=	43.07
OBSERVATION#	3	=	47.66
OBSERVATION#	4	=	42.79
OBSERVATION#	5	=	38.43
OBSERVATION#	6	=	42.76
OBSERVATION#	7	=	48.17
OBSERVATION#	8	=	45.49
OBSERVATION#	9	=	47.96
OBSERVATION#	10	=	46.34
OBSERVATION#	11	=	46.57
OBSERVATION#	12	=	37.7
OBSERVATION#	13	=	51.34
OBSERVATION#	14	=	43.49
OBSERVATION#	15	=	40.47
OBSERVATION#	16	=	43.51
OBSERVATION#	17	=	36.92
OBSERVATION#	18	=	44.38
OBSERVATION#	19	=	48.52
OBSERVATION#	20	=	46.78
OBSERVATION#	21	=	44.12
OBSERVATION#	22	=	49.79
OBSERVATION#	23	=	39.29
OBSERVATION#	24	=	43.18
OBSERVATION#	25	=	46.03
OBSERVATION#	26	=	46.98
OBSERVATION#	27	=	44.31
OBSERVATION#	28	=	38.55
OBSERVATION#	29	=	46.07
OBSERVATION#	30	=	42.75
OBSERVATION#	31	=	43.26
OBSERVATION#	32	=	41.24
OBSERVATION#	33	=	49.24
OBSERVATION#	34	=	45.01
OBSERVATION#	35	=	46.89
OBSERVATION#	36	=	37.69
OBSERVATION#	37	=	46.65
OBSERVATION#	38	=	34.92
OBSERVATION#	39	=	43.23
OBSERVATION#	40	=	45.33
OBSERVATION#	41	=	42.82
OBSERVATION#	42	=	41.32
OBSERVATION#	43	=	50.24
OBSERVATION#	44	=	43.76

ANOVA analysis of length of the test
animals on Day 62 post-hatch
(day 95 of test) using Solvent
Control in place of Control.

XAC 4/23/91

OBSERVATION#	45	=	39.08
OBSERVATION#	46	=	42.99
OBSERVATION#	47	=	34.9
OBSERVATION#	48	=	41.64
OBSERVATION#	49	=	39.1
OBSERVATION#	50	=	48.46
OBSERVATION#	51	=	42.88
OBSERVATION#	52	=	37.56
OBSERVATION#	53	=	49.73
OBSERVATION#	54	=	47.56
OBSERVATION#	55	=	39.71
OBSERVATION#	56	=	47.58
OBSERVATION#	57	=	46.58
OBSERVATION#	58	=	46.4
OBSERVATION#	59	=	38.44

TREATMENT# 2

OBSERVATION#	1	=	48.8
OBSERVATION#	2	=	48.52
OBSERVATION#	3	=	39.62
OBSERVATION#	4	=	45.4
OBSERVATION#	5	=	41
OBSERVATION#	6	=	47.93
OBSERVATION#	7	=	43.11
OBSERVATION#	8	=	39.44
OBSERVATION#	9	=	44.72
OBSERVATION#	10	=	46.25
OBSERVATION#	11	=	39.58
OBSERVATION#	12	=	42.73
OBSERVATION#	13	=	41.05
OBSERVATION#	14	=	45
OBSERVATION#	15	=	47.29
OBSERVATION#	16	=	45.7
OBSERVATION#	17	=	44.91
OBSERVATION#	18	=	43.1
OBSERVATION#	19	=	46.45
OBSERVATION#	20	=	43.51
OBSERVATION#	21	=	39.71
OBSERVATION#	22	=	46.3
OBSERVATION#	23	=	38.42
OBSERVATION#	24	=	44.75
OBSERVATION#	25	=	42.71
OBSERVATION#	26	=	44.03
OBSERVATION#	27	=	42.38
OBSERVATION#	28	=	41.84
OBSERVATION#	29	=	40.1
OBSERVATION#	30	=	46.66
OBSERVATION#	31	=	39.81
OBSERVATION#	32	=	44.03
OBSERVATION#	33	=	44.98
OBSERVATION#	34	=	43.4
OBSERVATION#	35	=	44.95
OBSERVATION#	36	=	36.1
OBSERVATION#	37	=	42.55
OBSERVATION#	38	=	45.54
OBSERVATION#	39	=	48.6
OBSERVATION#	40	=	36.58
OBSERVATION#	41	=	46.81
OBSERVATION#	42	=	38.58
OBSERVATION#	43	=	36.3
OBSERVATION#	44	=	39.84
OBSERVATION#	45	=	39.76
OBSERVATION#	46	=	44.14
OBSERVATION#	47	=	46.23

OBSERVATION#	48	=	43.57
OBSERVATION#	49	=	44.8
OBSERVATION#	50	=	40.22
OBSERVATION#	51	=	41.51
OBSERVATION#	52	=	41.22
OBSERVATION#	53	=	42.89
OBSERVATION#	54	=	40.22
OBSERVATION#	55	=	44.49
OBSERVATION#	56	=	42.29
OBSERVATION#	57	=	44.29
OBSERVATION#	58	=	49.78
OBSERVATION#	59	=	40.6

TREATMENT# 3

OBSERVATION#	1	=	46.34
OBSERVATION#	2	=	49.92
OBSERVATION#	3	=	47.04
OBSERVATION#	4	=	46.45
OBSERVATION#	5	=	47.79
OBSERVATION#	6	=	44.15
OBSERVATION#	7	=	45.14
OBSERVATION#	8	=	44.85
OBSERVATION#	9	=	44.93
OBSERVATION#	10	=	30.07
OBSERVATION#	11	=	41.27
OBSERVATION#	12	=	36.12
OBSERVATION#	13	=	42.38
OBSERVATION#	14	=	40.11
OBSERVATION#	15	=	39.23
OBSERVATION#	16	=	44.29
OBSERVATION#	17	=	43.98
OBSERVATION#	18	=	43.26
OBSERVATION#	19	=	45.06
OBSERVATION#	20	=	42.03
OBSERVATION#	21	=	44.27
OBSERVATION#	22	=	41.88
OBSERVATION#	23	=	43.22
OBSERVATION#	24	=	46.94
OBSERVATION#	25	=	43.53
OBSERVATION#	26	=	39.57
OBSERVATION#	27	=	43.03
OBSERVATION#	28	=	44.54
OBSERVATION#	29	=	39.9
OBSERVATION#	30	=	41.6
OBSERVATION#	31	=	49.22
OBSERVATION#	32	=	40.41
OBSERVATION#	33	=	44.72
OBSERVATION#	34	=	48.62
OBSERVATION#	35	=	43.96
OBSERVATION#	36	=	43.3
OBSERVATION#	37	=	33.75
OBSERVATION#	38	=	50.88
OBSERVATION#	39	=	43.22
OBSERVATION#	40	=	42.12
OBSERVATION#	41	=	36.55
OBSERVATION#	42	=	46.96
OBSERVATION#	43	=	47.08
OBSERVATION#	44	=	45.18
OBSERVATION#	45	=	41.87
OBSERVATION#	46	=	46.45
OBSERVATION#	47	=	50.48
OBSERVATION#	48	=	47.2
OBSERVATION#	49	=	52.02
OBSERVATION#	50	=	46.23

OBSERVATION#	51	=	41.73
OBSERVATION#	52	=	42.71
OBSERVATION#	53	=	43.14
OBSERVATION#	54	=	45.76
OBSERVATION#	55	=	44.56
OBSERVATION#	56	=	37.68
OBSERVATION#	57	=	48.84
OBSERVATION#	58	=	45.29
OBSERVATION#	59	=	48.41

TREATMENT# 4

OBSERVATION#	1	=	49.08
OBSERVATION#	2	=	40.82
OBSERVATION#	3	=	44.44
OBSERVATION#	4	=	39.07
OBSERVATION#	5	=	42.6
OBSERVATION#	6	=	43.34
OBSERVATION#	7	=	41.76
OBSERVATION#	8	=	47.65
OBSERVATION#	9	=	46.85
OBSERVATION#	10	=	45.57
OBSERVATION#	11	=	45.03
OBSERVATION#	12	=	44.51
OBSERVATION#	13	=	49.22
OBSERVATION#	14	=	43.65
OBSERVATION#	15	=	45.42
OBSERVATION#	16	=	41.98
OBSERVATION#	17	=	50.24
OBSERVATION#	18	=	40.94
OBSERVATION#	19	=	39.17
OBSERVATION#	20	=	43.41
OBSERVATION#	21	=	41.62
OBSERVATION#	22	=	49.99
OBSERVATION#	23	=	48.96
OBSERVATION#	24	=	43.29
OBSERVATION#	25	=	46.52
OBSERVATION#	26	=	36.64
OBSERVATION#	27	=	41.61
OBSERVATION#	28	=	43.14
OBSERVATION#	29	=	43.37
OBSERVATION#	30	=	46.23
OBSERVATION#	31	=	49.61
OBSERVATION#	32	=	46.05
OBSERVATION#	33	=	40.39
OBSERVATION#	34	=	47
OBSERVATION#	35	=	41.88
OBSERVATION#	36	=	40.28
OBSERVATION#	37	=	41.13
OBSERVATION#	38	=	46.15
OBSERVATION#	39	=	47.1
OBSERVATION#	40	=	40.73
OBSERVATION#	41	=	40.73
OBSERVATION#	42	=	42.37
OBSERVATION#	43	=	43.54
OBSERVATION#	44	=	43.96
OBSERVATION#	45	=	45.09
OBSERVATION#	46	=	45.91
OBSERVATION#	47	=	44.53
OBSERVATION#	48	=	43.52
OBSERVATION#	49	=	43.33
OBSERVATION#	50	=	42.62
OBSERVATION#	51	=	42.53
OBSERVATION#	52	=	46.29
OBSERVATION#	53	=	42.88

OBSERVATION#	54	=	46.78
OBSERVATION#	55	=	39.06
OBSERVATION#	56	=	38.74
OBSERVATION#	57	=	43.03
OBSERVATION#	58	=	40.21

TREATMENT# 5

OBSERVATION#	1	=	38.66
OBSERVATION#	2	=	47.76
OBSERVATION#	3	=	44.23
OBSERVATION#	4	=	43.19
OBSERVATION#	5	=	44.81
OBSERVATION#	6	=	36.56
OBSERVATION#	7	=	44.16
OBSERVATION#	8	=	45.85
OBSERVATION#	9	=	45.43
OBSERVATION#	10	=	39.6
OBSERVATION#	11	=	43.87
OBSERVATION#	12	=	45.8
OBSERVATION#	13	=	41.43
OBSERVATION#	14	=	48
OBSERVATION#	15	=	47.15
OBSERVATION#	16	=	47.99
OBSERVATION#	17	=	36.25
OBSERVATION#	18	=	47.69
OBSERVATION#	19	=	47.82
OBSERVATION#	20	=	44.21
OBSERVATION#	21	=	43.63
OBSERVATION#	22	=	47.62
OBSERVATION#	23	=	41.15
OBSERVATION#	24	=	43.39
OBSERVATION#	25	=	47.8
OBSERVATION#	26	=	44.89
OBSERVATION#	27	=	39.9
OBSERVATION#	28	=	42.76
OBSERVATION#	29	=	43.19
OBSERVATION#	30	=	40.37
OBSERVATION#	31	=	38.23
OBSERVATION#	32	=	40.15
OBSERVATION#	33	=	39.85
OBSERVATION#	34	=	37.04
OBSERVATION#	35	=	43.83
OBSERVATION#	36	=	42.05
OBSERVATION#	37	=	35.52
OBSERVATION#	38	=	37.92
OBSERVATION#	39	=	34.51
OBSERVATION#	40	=	40.83
OBSERVATION#	41	=	42
OBSERVATION#	42	=	41.88
OBSERVATION#	43	=	43.97
OBSERVATION#	44	=	41.4
OBSERVATION#	45	=	38.61
OBSERVATION#	46	=	36.95
OBSERVATION#	47	=	38.23
OBSERVATION#	48	=	41.48
OBSERVATION#	49	=	38.73
OBSERVATION#	50	=	40.79
OBSERVATION#	51	=	41.52
OBSERVATION#	52	=	35.67
OBSERVATION#	53	=	38.28
OBSERVATION#	54	=	41.34
OBSERVATION#	55	=	36.93
OBSERVATION#	56	=	40
OBSERVATION#	57	=	42.69

OBSERVATION# 58 = 40.73
OBSERVATION# 59 = 40.61
OBSERVATION# 60 = 36.42

SSTO= 4025.438

SSTR= 200.25

SSE= 3825.188

MSTR= 50.0625

MSE= 13.1903

F= 3.795402

WILLIAMS

NUMBER OF REPS IN CONTROL 2

NUMBER OF REPS IN TREATMENT 1 = 2

SD= 3.631845

NUMBER OF REPS IN TREATMENT 2 = 2

SD= 3.631845

NUMBER OF REPS IN TREATMENT 3 = 2

SD= 3.631845

NUMBER OF REPS IN TREATMENT 4 = 2

SD= 3.631845

DATA ENTERED BY : Kelly A. Carr Initials: _____

DATE : 04-09-1991

PROJECT# :

TEST SPECIES :

TOXICANT : PCNB

File name = 1gth35d.RPT
Date of report : 04-09-1991

ANOVA FOR UNEQUAL REPLICATES

TREATMENT# 1

OBSERVATION#	1	=	28.93
OBSERVATION#	2	=	32.2
OBSERVATION#	3	=	28.73
OBSERVATION#	4	=	28.42
OBSERVATION#	5	=	27.98
OBSERVATION#	6	=	27.68
OBSERVATION#	7	=	26.89
OBSERVATION#	8	=	28.23
OBSERVATION#	9	=	31.44
OBSERVATION#	10	=	30.32
OBSERVATION#	11	=	29.58
OBSERVATION#	12	=	31.42
OBSERVATION#	13	=	29.73
OBSERVATION#	14	=	26.92
OBSERVATION#	15	=	30.47
OBSERVATION#	16	=	30.7
OBSERVATION#	17	=	30.12
OBSERVATION#	18	=	25.59
OBSERVATION#	19	=	28.85
OBSERVATION#	20	=	31.59
OBSERVATION#	21	=	30.82
OBSERVATION#	22	=	32.18
OBSERVATION#	23	=	28.91
OBSERVATION#	24	=	30.25
OBSERVATION#	25	=	30.89
OBSERVATION#	26	=	27.77
OBSERVATION#	27	=	26.86
OBSERVATION#	28	=	30.48
OBSERVATION#	29	=	29.14
OBSERVATION#	30	=	32.73
OBSERVATION#	31	=	29.1
OBSERVATION#	32	=	29.49
OBSERVATION#	33	=	28.24
OBSERVATION#	34	=	31.15
OBSERVATION#	35	=	30.51
OBSERVATION#	36	=	28.8
OBSERVATION#	37	=	27.29
OBSERVATION#	38	=	24.82
OBSERVATION#	39	=	32.05
OBSERVATION#	40	=	30.3
OBSERVATION#	41	=	27.28
OBSERVATION#	42	=	31.69
OBSERVATION#	43	=	27.71
OBSERVATION#	44	=	28.79

ANOVA analysis of length of test
animals on Day 35^{post-hatch} (using the
Solvent Control as the Control
concentration).

XAC 4/23/91

OBSERVATION#	45	=	28.17
OBSERVATION#	46	=	29.35
OBSERVATION#	47	=	31.06
OBSERVATION#	48	=	29.26
OBSERVATION#	49	=	27.17
OBSERVATION#	50	=	26.67
OBSERVATION#	51	=	28.38
OBSERVATION#	52	=	27.56
OBSERVATION#	53	=	28.01
OBSERVATION#	54	=	30.23
OBSERVATION#	55	=	31.14
OBSERVATION#	56	=	32.13
OBSERVATION#	57	=	26.96
OBSERVATION#	58	=	29.81
OBSERVATION#	59	=	27.72
OBSERVATION#	60	=	32.3

TREATMENT# 2

OBSERVATION#	1	=	29.87
OBSERVATION#	2	=	26.38
OBSERVATION#	3	=	28.79
OBSERVATION#	4	=	30.57
OBSERVATION#	5	=	31.29
OBSERVATION#	6	=	31.66
OBSERVATION#	7	=	27.76
OBSERVATION#	8	=	31.58
OBSERVATION#	9	=	28.72
OBSERVATION#	10	=	31.23
OBSERVATION#	11	=	30.01
OBSERVATION#	12	=	28.12
OBSERVATION#	13	=	30.23
OBSERVATION#	14	=	30.34
OBSERVATION#	15	=	30.69
OBSERVATION#	16	=	31.38
OBSERVATION#	17	=	30.03
OBSERVATION#	18	=	30.02
OBSERVATION#	19	=	29.64
OBSERVATION#	20	=	30.03
OBSERVATION#	21	=	28.83
OBSERVATION#	22	=	28.87
OBSERVATION#	23	=	29.62
OBSERVATION#	24	=	29.06
OBSERVATION#	25	=	30.66
OBSERVATION#	26	=	27.43
OBSERVATION#	27	=	28.32
OBSERVATION#	28	=	28.99
OBSERVATION#	29	=	28.21
OBSERVATION#	30	=	26.14
OBSERVATION#	31	=	27.74
OBSERVATION#	32	=	28.11
OBSERVATION#	33	=	30.59
OBSERVATION#	34	=	32.62
OBSERVATION#	35	=	31.41
OBSERVATION#	36	=	27.03
OBSERVATION#	37	=	27.36
OBSERVATION#	38	=	27.43
OBSERVATION#	39	=	29.96
OBSERVATION#	40	=	28.51
OBSERVATION#	41	=	27.33
OBSERVATION#	42	=	27.98
OBSERVATION#	43	=	29.79
OBSERVATION#	44	=	29.73
OBSERVATION#	45	=	28.3
OBSERVATION#	46	=	26.81

OBSERVATION#	47	=	29.31
OBSERVATION#	48	=	29.67
OBSERVATION#	49	=	28.55
OBSERVATION#	50	=	27.89
OBSERVATION#	51	=	28.18
OBSERVATION#	52	=	28.7
OBSERVATION#	53	=	28.43
OBSERVATION#	54	=	27.79
OBSERVATION#	55	=	26.1
OBSERVATION#	56	=	29.72
OBSERVATION#	57	=	28.99
OBSERVATION#	58	=	31.21
OBSERVATION#	59	=	26.52
OBSERVATION#	60	=	27.65

TREATMENT# 3

OBSERVATION#	1	=	30.71
OBSERVATION#	2	=	29.98
OBSERVATION#	3	=	29.2
OBSERVATION#	4	=	26.9
OBSERVATION#	5	=	29.96
OBSERVATION#	6	=	31.46
OBSERVATION#	7	=	28.05
OBSERVATION#	8	=	26.43
OBSERVATION#	9	=	31.97
OBSERVATION#	10	=	29.74
OBSERVATION#	11	=	29.85
OBSERVATION#	12	=	30.08
OBSERVATION#	13	=	30.83
OBSERVATION#	14	=	25.95
OBSERVATION#	15	=	29.44
OBSERVATION#	16	=	30.79
OBSERVATION#	17	=	29.02
OBSERVATION#	18	=	28.15
OBSERVATION#	19	=	28.84
OBSERVATION#	20	=	28.31
OBSERVATION#	21	=	28.22
OBSERVATION#	22	=	29.63
OBSERVATION#	23	=	28.72
OBSERVATION#	24	=	29.58
OBSERVATION#	25	=	30.14
OBSERVATION#	26	=	28.57
OBSERVATION#	27	=	28.27
OBSERVATION#	28	=	30.21
OBSERVATION#	29	=	28.67
OBSERVATION#	30	=	30.62
OBSERVATION#	31	=	25.2
OBSERVATION#	32	=	28.37
OBSERVATION#	33	=	29.75
OBSERVATION#	34	=	32.98
OBSERVATION#	35	=	29.23
OBSERVATION#	36	=	28.88
OBSERVATION#	37	=	30.14
OBSERVATION#	38	=	32.52
OBSERVATION#	39	=	29.72
OBSERVATION#	40	=	28.8
OBSERVATION#	41	=	30.66
OBSERVATION#	42	=	27.46
OBSERVATION#	43	=	25.14
OBSERVATION#	44	=	30.8
OBSERVATION#	45	=	31.83
OBSERVATION#	46	=	30.32
OBSERVATION#	47	=	34.04
OBSERVATION#	48	=	28.72

OBSERVATION#	49	=	31.38
OBSERVATION#	50	=	32.13
OBSERVATION#	51	=	26.82
OBSERVATION#	52	=	28.03
OBSERVATION#	53	=	30.31
OBSERVATION#	54	=	31.01
OBSERVATION#	55	=	29.44
OBSERVATION#	56	=	28.54
OBSERVATION#	57	=	31.22
OBSERVATION#	58	=	32.68
OBSERVATION#	59	=	21.28
OBSERVATION#	60	=	29.87

TREATMENT# 4

OBSERVATION#	1	=	28.27
OBSERVATION#	2	=	29.69
OBSERVATION#	3	=	31.02
OBSERVATION#	4	=	29.1
OBSERVATION#	5	=	32.03
OBSERVATION#	6	=	29.05
OBSERVATION#	7	=	30.74
OBSERVATION#	8	=	30.71
OBSERVATION#	9	=	22.84
OBSERVATION#	10	=	32.85
OBSERVATION#	11	=	26.57
OBSERVATION#	12	=	27.62
OBSERVATION#	13	=	29.88
OBSERVATION#	14	=	30.52
OBSERVATION#	15	=	31.19
OBSERVATION#	16	=	26.41
OBSERVATION#	17	=	30.33
OBSERVATION#	18	=	31.42
OBSERVATION#	19	=	30.3
OBSERVATION#	20	=	28.72
OBSERVATION#	21	=	28.6
OBSERVATION#	22	=	27.42
OBSERVATION#	23	=	28.09
OBSERVATION#	24	=	32.32
OBSERVATION#	25	=	30.43
OBSERVATION#	26	=	31.97
OBSERVATION#	27	=	28.38
OBSERVATION#	28	=	27.87
OBSERVATION#	29	=	30.69
OBSERVATION#	30	=	27.63
OBSERVATION#	31	=	27.05
OBSERVATION#	32	=	29.74
OBSERVATION#	33	=	29.16
OBSERVATION#	34	=	30.96
OBSERVATION#	35	=	30.69
OBSERVATION#	36	=	28.57
OBSERVATION#	37	=	26.9
OBSERVATION#	38	=	27.75
OBSERVATION#	39	=	26.37
OBSERVATION#	40	=	27.88
OBSERVATION#	41	=	27.3
OBSERVATION#	42	=	31.8
OBSERVATION#	43	=	27.98
OBSERVATION#	44	=	30.15
OBSERVATION#	45	=	30.59
OBSERVATION#	46	=	30.55
OBSERVATION#	47	=	29.78
OBSERVATION#	48	=	28.91
OBSERVATION#	49	=	27.52
OBSERVATION#	50	=	28.26

OBSERVATION#	51	=	27.4
OBSERVATION#	52	=	26.5
OBSERVATION#	53	=	29.19
OBSERVATION#	54	=	27.16
OBSERVATION#	55	=	30.13
OBSERVATION#	56	=	31.01
OBSERVATION#	57	=	30.99
OBSERVATION#	58	=	29.26
OBSERVATION#	59	=	28.52
OBSERVATION#	60	=	26.7

TREATMENT# 5

OBSERVATION#	1	=	29.81
OBSERVATION#	2	=	28.53
OBSERVATION#	3	=	28.33
OBSERVATION#	4	=	29.11
OBSERVATION#	5	=	30.76
OBSERVATION#	6	=	29.18
OBSERVATION#	7	=	29.42
OBSERVATION#	8	=	25.49
OBSERVATION#	9	=	27.17
OBSERVATION#	10	=	31.1
OBSERVATION#	11	=	29.73
OBSERVATION#	12	=	30.82
OBSERVATION#	13	=	28.95
OBSERVATION#	14	=	28.48
OBSERVATION#	15	=	29.05
OBSERVATION#	16	=	27.93
OBSERVATION#	17	=	27.71
OBSERVATION#	18	=	27.97
OBSERVATION#	19	=	31.94
OBSERVATION#	20	=	30.98
OBSERVATION#	21	=	28.08
OBSERVATION#	22	=	28.78
OBSERVATION#	23	=	27.48
OBSERVATION#	24	=	27.44
OBSERVATION#	25	=	29.77
OBSERVATION#	26	=	29.64
OBSERVATION#	27	=	28.03
OBSERVATION#	28	=	29.9
OBSERVATION#	29	=	29.04
OBSERVATION#	30	=	29.43
OBSERVATION#	31	=	27.28
OBSERVATION#	32	=	29.7
OBSERVATION#	33	=	27.56
OBSERVATION#	34	=	24.28
OBSERVATION#	35	=	27.59
OBSERVATION#	36	=	28.17
OBSERVATION#	37	=	29.86
OBSERVATION#	38	=	28.04
OBSERVATION#	39	=	27.13
OBSERVATION#	40	=	32.06
OBSERVATION#	41	=	27.76
OBSERVATION#	42	=	26.61
OBSERVATION#	43	=	25.15
OBSERVATION#	44	=	26.74
OBSERVATION#	45	=	24.61
OBSERVATION#	46	=	25.8
OBSERVATION#	47	=	27.04
OBSERVATION#	48	=	28.63
OBSERVATION#	49	=	27.59
OBSERVATION#	50	=	28.23
OBSERVATION#	51	=	27.95
OBSERVATION#	52	=	27.37

OBSERVATION# 53 = 28.68
OBSERVATION# 54 = 26.7
OBSERVATION# 55 = 28.44
OBSERVATION# 56 = 28.39
OBSERVATION# 57 = 23.08
OBSERVATION# 58 = 26.21
OBSERVATION# 59 = 26.85
OBSERVATION# 60 = 27.16

SSTO= 1044.922

SSTR= 58.40625

SSE= 986.5156

MSTR= 14.60156

MSE= 3.344121

F= 4.366338

WILLIAMS

NUMBER OF REPS IN CONTROL 2

NUMBER OF REPS IN TREATMENT 1 = 2

SD= 1.828694

NUMBER OF REPS IN TREATMENT 2 = 2

SD= 1.828694

NUMBER OF REPS IN TREATMENT 3 = 2

SD= 1.828694

NUMBER OF REPS IN TREATMENT 4 = 2

SD= 1.828694

DATA ENTERED BY : Kelly A. Carr Initials: _____

DATE : 04-09-1991

PROJECT# :

TEST SPECIES :

TOXICANT : PCNB

File name = wt62d.RPT
Date of report : 04-08-1991

ANOVA FOR UNEQUAL REPLICATES

TREATMENT# 1

OBSERVATION#	1	=	1.73
OBSERVATION#	2	=	.85
OBSERVATION#	3	=	1.07
OBSERVATION#	4	=	1.11
OBSERVATION#	5	=	2.05
OBSERVATION#	6	=	1.55
OBSERVATION#	7	=	1.37
OBSERVATION#	8	=	1.64
OBSERVATION#	9	=	1.23
OBSERVATION#	10	=	1.69
OBSERVATION#	11	=	1.65
OBSERVATION#	12	=	1.17
OBSERVATION#	13	=	.82
OBSERVATION#	14	=	1.23
OBSERVATION#	15	=	1.37
OBSERVATION#	16	=	1.3
OBSERVATION#	17	=	.81
OBSERVATION#	18	=	1.59
OBSERVATION#	19	=	1.17
OBSERVATION#	20	=	1.88
OBSERVATION#	21	=	1.76
OBSERVATION#	22	=	1.19
OBSERVATION#	23	=	.98
OBSERVATION#	24	=	.74
OBSERVATION#	25	=	1.68
OBSERVATION#	26	=	1.09
OBSERVATION#	27	=	1.24
OBSERVATION#	28	=	1.46
OBSERVATION#	29	=	1.33
OBSERVATION#	30	=	1.94
OBSERVATION#	31	=	1.22
OBSERVATION#	32	=	.82
OBSERVATION#	33	=	1.33
OBSERVATION#	34	=	1.06
OBSERVATION#	35	=	.88
OBSERVATION#	36	=	1.52
OBSERVATION#	37	=	1.16
OBSERVATION#	38	=	1.6
OBSERVATION#	39	=	.67
OBSERVATION#	40	=	1.22
OBSERVATION#	41	=	2.23
OBSERVATION#	42	=	1.2
OBSERVATION#	43	=	1.07
OBSERVATION#	44	=	1.51

ANOVA analysis of the weight of the
test animals on Day 62 post-hatch
(day 95 of the test) using Solvent
Control for the control concentration

KAC 4/23/91

OBSERVATION#	45	=	.95
OBSERVATION#	46	=	1.38
OBSERVATION#	47	=	1.2
OBSERVATION#	48	=	1.02
OBSERVATION#	49	=	1.91
OBSERVATION#	50	=	1.51
OBSERVATION#	51	=	.63
OBSERVATION#	52	=	1.88
OBSERVATION#	53	=	1.77
OBSERVATION#	54	=	.77
OBSERVATION#	55	=	1.2
OBSERVATION#	56	=	.95
OBSERVATION#	57	=	1.04
OBSERVATION#	58	=	1.51
OBSERVATION#	59	=	.8

TREATMENT# 2

OBSERVATION#	1	=	1.43
OBSERVATION#	2	=	.98
OBSERVATION#	3	=	1.34
OBSERVATION#	4	=	1.22
OBSERVATION#	5	=	1.07
OBSERVATION#	6	=	1.65
OBSERVATION#	7	=	1.66
OBSERVATION#	8	=	1.54
OBSERVATION#	9	=	1
OBSERVATION#	10	=	1.56
OBSERVATION#	11	=	.99
OBSERVATION#	12	=	1.05
OBSERVATION#	13	=	.97
OBSERVATION#	14	=	1.59
OBSERVATION#	15	=	1.46
OBSERVATION#	16	=	1.33
OBSERVATION#	17	=	1.24
OBSERVATION#	18	=	.83
OBSERVATION#	19	=	.88
OBSERVATION#	20	=	1.37
OBSERVATION#	21	=	1.46
OBSERVATION#	22	=	1.62
OBSERVATION#	23	=	.8
OBSERVATION#	24	=	1.35
OBSERVATION#	25	=	1.17
OBSERVATION#	26	=	1.1
OBSERVATION#	27	=	1.47
OBSERVATION#	28	=	1.36
OBSERVATION#	29	=	1.74
OBSERVATION#	30	=	1.44
OBSERVATION#	31	=	1.29
OBSERVATION#	32	=	1.27
OBSERVATION#	33	=	1.55
OBSERVATION#	34	=	.85
OBSERVATION#	35	=	.88
OBSERVATION#	36	=	1.44
OBSERVATION#	37	=	.71
OBSERVATION#	38	=	.85
OBSERVATION#	39	=	1.27
OBSERVATION#	40	=	1.93
OBSERVATION#	41	=	.9
OBSERVATION#	42	=	1.2
OBSERVATION#	43	=	1.27
OBSERVATION#	44	=	.67
OBSERVATION#	45	=	.94
OBSERVATION#	46	=	1.58
OBSERVATION#	47	=	1.32

OBSERVATION#	48	=	1.05
OBSERVATION#	49	=	1.32
OBSERVATION#	50	=	.99
OBSERVATION#	51	=	1.02
OBSERVATION#	52	=	1.97
OBSERVATION#	53	=	1.12
OBSERVATION#	54	=	1.11
OBSERVATION#	55	=	1.3
OBSERVATION#	56	=	1
OBSERVATION#	57	=	1.32
OBSERVATION#	58	=	1.02
OBSERVATION#	59	=	1.21

TREATMENT# 3

OBSERVATION#	1	=	1.52
OBSERVATION#	2	=	1.07
OBSERVATION#	3	=	1.34
OBSERVATION#	4	=	1.56
OBSERVATION#	5	=	1.35
OBSERVATION#	6	=	1.65
OBSERVATION#	7	=	1.37
OBSERVATION#	8	=	1.06
OBSERVATION#	9	=	2.08
OBSERVATION#	10	=	.41
OBSERVATION#	11	=	1.25
OBSERVATION#	12	=	.91
OBSERVATION#	13	=	.88
OBSERVATION#	14	=	1.54
OBSERVATION#	15	=	1.43
OBSERVATION#	16	=	1.64
OBSERVATION#	17	=	1.31
OBSERVATION#	18	=	1.34
OBSERVATION#	19	=	1.15
OBSERVATION#	20	=	1.26
OBSERVATION#	21	=	1.11
OBSERVATION#	22	=	1.26
OBSERVATION#	23	=	1.12
OBSERVATION#	24	=	1.19
OBSERVATION#	25	=	1.02
OBSERVATION#	26	=	.89
OBSERVATION#	27	=	1.24
OBSERVATION#	28	=	1.44
OBSERVATION#	29	=	1.24
OBSERVATION#	30	=	1.36
OBSERVATION#	31	=	1.3
OBSERVATION#	32	=	.56
OBSERVATION#	33	=	1.67
OBSERVATION#	34	=	.91
OBSERVATION#	35	=	1.28
OBSERVATION#	36	=	1.36
OBSERVATION#	37	=	1.07
OBSERVATION#	38	=	1.51
OBSERVATION#	39	=	1.52
OBSERVATION#	40	=	2.07
OBSERVATION#	41	=	1.23
OBSERVATION#	42	=	1.92
OBSERVATION#	43	=	1.75
OBSERVATION#	44	=	1.23
OBSERVATION#	45	=	.88
OBSERVATION#	46	=	1.27
OBSERVATION#	47	=	1.61
OBSERVATION#	48	=	1.89
OBSERVATION#	49	=	.73
OBSERVATION#	50	=	1.53

OBSERVATION#	51	=	1.52
OBSERVATION#	52	=	1.56
OBSERVATION#	53	=	1.07
OBSERVATION#	54	=	1.83
OBSERVATION#	55	=	1.34
OBSERVATION#	56	=	1.89
OBSERVATION#	57	=	1.05
OBSERVATION#	58	=	1.9
OBSERVATION#	59	=	1.46

TREATMENT# 4

OBSERVATION#	1	=	1.55
OBSERVATION#	2	=	1.32
OBSERVATION#	3	=	1.03
OBSERVATION#	4	=	1.42
OBSERVATION#	5	=	2.19
OBSERVATION#	6	=	1.06
OBSERVATION#	7	=	1.37
OBSERVATION#	8	=	.83
OBSERVATION#	9	=	1.43
OBSERVATION#	10	=	1.89
OBSERVATION#	11	=	1
OBSERVATION#	12	=	.99
OBSERVATION#	13	=	1.47
OBSERVATION#	14	=	1.14
OBSERVATION#	15	=	1.24
OBSERVATION#	16	=	1.5
OBSERVATION#	17	=	1
OBSERVATION#	18	=	1.27
OBSERVATION#	19	=	1.14
OBSERVATION#	20	=	1.14
OBSERVATION#	21	=	1.36
OBSERVATION#	22	=	2.11
OBSERVATION#	23	=	1.9
OBSERVATION#	24	=	1.11
OBSERVATION#	25	=	1.32
OBSERVATION#	26	=	.82
OBSERVATION#	27	=	1.94
OBSERVATION#	28	=	1.57
OBSERVATION#	29	=	1.72
OBSERVATION#	30	=	1.65
OBSERVATION#	31	=	1.5
OBSERVATION#	32	=	.92
OBSERVATION#	33	=	1.08
OBSERVATION#	34	=	1.45
OBSERVATION#	35	=	1.68
OBSERVATION#	36	=	1.16
OBSERVATION#	37	=	1.36
OBSERVATION#	38	=	.99
OBSERVATION#	39	=	1.02
OBSERVATION#	40	=	1.16
OBSERVATION#	41	=	.85
OBSERVATION#	42	=	1.39
OBSERVATION#	43	=	1.17
OBSERVATION#	44	=	1.21
OBSERVATION#	45	=	1.19
OBSERVATION#	46	=	1.33
OBSERVATION#	47	=	1.58
OBSERVATION#	48	=	1.29
OBSERVATION#	49	=	1.29
OBSERVATION#	50	=	1.2
OBSERVATION#	51	=	.81
OBSERVATION#	52	=	.81
OBSERVATION#	53	=	1.47

OBSERVATION# 58 = .81
OBSERVATION# 59 = .88
OBSERVATION# 60 = .98

SSTO= 34.10583

SSTR= 2.596313

SSE= 31.50952

MSTR= .6490784

MSE= .1086535

F= 5.973836

WILLIAMS

NUMBER OF REPS IN CONTROL 2

NUMBER OF REPS IN TREATMENT 1 = 2

SD= .3296264

NUMBER OF REPS IN TREATMENT 2 = 2

SD= .3296264

NUMBER OF REPS IN TREATMENT 3 = 2

SD= .3296264

NUMBER OF REPS IN TREATMENT 4 = 2

SD= .3296264

DATA ENTERED BY : Kelly A. Carr Initials: _____

DATE : 04-09-1991

PROJECT# :

TEST SPECIES :

TOXICANT : PCNB

OBSERVATION#	54	=	1.17
OBSERVATION#	55	=	1.51
OBSERVATION#	56	=	.9
OBSERVATION#	57	=	1.38
OBSERVATION#	58	=	.92

TREATMENT# 5

OBSERVATION#	1	=	1.45
OBSERVATION#	2	=	.76
OBSERVATION#	3	=	1.08
OBSERVATION#	4	=	.75
OBSERVATION#	5	=	.78
OBSERVATION#	6	=	1.3
OBSERVATION#	7	=	1.4
OBSERVATION#	8	=	1.51
OBSERVATION#	9	=	1.33
OBSERVATION#	10	=	1.6
OBSERVATION#	11	=	1.28
OBSERVATION#	12	=	.93
OBSERVATION#	13	=	1.41
OBSERVATION#	14	=	1.67
OBSERVATION#	15	=	1.48
OBSERVATION#	16	=	1.34
OBSERVATION#	17	=	1.5
OBSERVATION#	18	=	1.11
OBSERVATION#	19	=	1.62
OBSERVATION#	20	=	1.59
OBSERVATION#	21	=	.79
OBSERVATION#	22	=	1.26
OBSERVATION#	23	=	1
OBSERVATION#	24	=	1.17
OBSERVATION#	25	=	1.45
OBSERVATION#	26	=	1.69
OBSERVATION#	27	=	1.07
OBSERVATION#	28	=	1.46
OBSERVATION#	29	=	.92
OBSERVATION#	30	=	.71
OBSERVATION#	31	=	.77
OBSERVATION#	32	=	.64
OBSERVATION#	33	=	1.13
OBSERVATION#	34	=	.73
OBSERVATION#	35	=	.89
OBSERVATION#	36	=	1.14
OBSERVATION#	37	=	1.09
OBSERVATION#	38	=	.94
OBSERVATION#	39	=	.68
OBSERVATION#	40	=	.66
OBSERVATION#	41	=	1.23
OBSERVATION#	42	=	.62
OBSERVATION#	43	=	.74
OBSERVATION#	44	=	1
OBSERVATION#	45	=	1.04
OBSERVATION#	46	=	1.12
OBSERVATION#	47	=	.72
OBSERVATION#	48	=	.78
OBSERVATION#	49	=	.97
OBSERVATION#	50	=	.62
OBSERVATION#	51	=	.85
OBSERVATION#	52	=	.89
OBSERVATION#	53	=	1.26
OBSERVATION#	54	=	.99
OBSERVATION#	55	=	.99
OBSERVATION#	56	=	.85
OBSERVATION#	57	=	1.02